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Foreign State Papers.

MESSAGE

Of the Vice-President of Colombia, charged with the Government, to the Congress of 1825.

(Concluded.)

palities. But that this arrangement may be beneficial, a law is required to fix and dispose of the rent of the public lands. The health and convenience of the towns, and the good state of the roads required for easy communications, make it necessary that certain funds be provided, without which the municipalities will ever be of inferior consideration.

In a general view, I am justified in saying, that the order and regularity of the march of the constitutional authority have not been disturbed. The functionaries discover an increasing respect for our institutions, and the citizens enjoy the uninterrupted privilege of claiming the execution of the laws. It would, indeed, be a political phenomenon, for an infant society to advance in prosperity, without some obstructions and without discovering some weakness. Colombia must still bear the evils of inexperience, and the constant suggestions of her enemies; but neither can have any effect in retarding the career of the Republic towards that point at which she must soon arrive. The disturbances of Pasto, which, from the nature of that country, and the character of the people, it was thought, might be of some duration, have been quieted, and the government has been as indulgent on this occasion, as the public safety would allow. The same vigilance and activity that have destroyed this germ of disunion will also crush any future designs of weak persons against public order. The people desire to live peaceably under the protection of the laws; and as long as they will care to preserve order, and maintain our institutions, the Republic will enjoy peace at home, and the military will be released from this duty.

Our internal commerce requires some regulations for the encouragement of navigation and the suppression of the abuses attending it; and our foreign commerce with coasts inhabited by wandering tribes, demands special laws to relieve the Executive from the embarrassments he has suffered for some years past. I propose to the Congress to pass a law prohibiting the grant of letters of naturalization to foreigners of any nation, with which the Republic may be at war. This law belongs to the code of that nation which may be called really free, and on the advantage of which regulation, it is not necessary that I should remark.

The exhausted state of the national Treasury will continue to exist, as long as the payment of the deferred debts shall be charged upon the ordinary annual revenue, and no system adopted for fixing and properly meeting the public expenditure. To these causes, may be added our obligation to augment the standing army for a vigorous resistance to the hostile designs of Spain. From the shortness of the time, I have not been able to furnish a correct view of the progress made by the national Treasury, in accordance with the laws enacted at the last session. The executive, with great economy, has organized the general superintendency, and the departmental treasuries and accounting offices. It is desirable that, at this session, the legislature should enact a uniform regulation of the tithe-rents, and amend the law as to direct taxes, and also consider the different subjects that the Executive, by virtue of the constitution, will submit.

The many difficulties that have arisen in regard

to the loan of March, 1822, have been settled satisfactorily to the parties interested, and with honour to the republic. In this transaction, the Executive used the power conferred on him by your act of the 1st of July, 1823, the result of which will be communicated to you at an early day. The Congress should be gratified, that the course which we have pursued in this business, has merited the unqualified approbation of the most distinguished foreigners, who have understood its difficulties.

I will also submit to you a circumstantial account of the manner and conditions, on which the loan decred on the 30th of June, of last year, has been raised. Those acquainted with the history of the loans of other nations, have thought the terms of the present one to be advantageous. The Executive acknowledges, that his agents confined themselves to their instructions; and their negociations were conducted under the direction and knowledge of the Minister of Colombia at London, whose deportment has merited the approbation of all persons. To the Executive it was gratifying, that the business pending in regard to the former loan was adjusted before the new one had been negociated; and he availed himself of circumstances, which, if neglected at the time, would have reduced us to the necessity of accepting unfavourable terms. You will examine with attention the documents to be presented to you, and the Secretary of the Treasury will communicate to you whatever information may be called for; because in this examination the interests of our constituents and the good faith of the republic are involved. I congratulate myself by anticipation, that the Congress and the nation will be satisfied on this subject.

It is very important to the public prosperity and credit, that you should direct your attention to the funding of the national debt. Every year accumulates difficulties upon the succeeding. This debt embraces different periods, various objects, and creditors who are not properly classified. We should arrange it, and appropriate money for the punctual payment of the interest, and the gradual liquidation of the principal. You will agree, that the act of the last session on this subject is irregular and insufficient.

The standing army continues to exhibit evidence of its obedience to the laws. There have been no enemies to combat within the limits of the republic, but the army has been kept on the war establishment, as required by the politics of Europe. The Executive deferred the levy of 50,000 men decreed by law, till it should appear to him proper for reinforcing the auxilary army of Peru, to cover the departments bordering on the ocean, and to organize *corps de reserve* in the interior. The national militia has been ordered to be organized, in the manner prescribed by a resolution of the constituent congress, which will increase the battalions already formed, by numerous corps of citizens, whose first duty, will be the defence of the country. You will consider the provisional decrees of the Executive in execution of the laws upon this subject, and will enact permanent regulations embracing every object, for the national militia. These measures, and the abundant materials of war that we possess, have placed the Republic in the attitude of complete preparation, for the defence of her independence and her liberty.

Our navy has been enlarged and improved, as circumstances have allowed. The flag of Colombia has commanded respect in every sea, and wherever it has combated with that of Spain, has there established its superiority, and demonstrated the bravery of our marine. The Executive has taken measures to fix at once the total of the navy, both at sea and on the coasts and rivers. But little advantage, however, will result, if instruction be not applied to this branch of our force, and if laws organizing and governing it, of which I have before spoken, be not enacted. Naval schools have been commenced at Carthagena and Guayaquil, with the inadequate resources at the disposition of the Executive; but they cannot succeed well, unless the Congress shall aid them. Having recommended the future condition of the army, in my former messages, and suggested the laws that seemed to me proper and necessary, I content myself with referring to them, and hope that objects of such importance may command your attention at the present session.

This is the state of the Republic, in the different departments of its administration: a friendly intercourse with the American and foreign governments; regularity in its treaties and conventions; order and quiet at home; a respect for, and submission to the laws; the freedom of the press; the diffusion and promotion of public education; a just prospect of the increase of the national revenue; an army crowned with laurels, and sacred to the cause of liberty and independence; and ample resources to maintain, in any event, its dignity, its government and its laws. It belongs to you to remove the impediments to the successful career of the Republic, and to remedy the evils denounced by public opinion, and your own sentiments. If we will recur to the time when our code was first published, and recollect what Colombia then was, we will acknowledge, with agreeable surprise, the difficulties she has surmounted, and the advancement she has made. This acknowledgment should encourage us to pursne the exercise of our respective powers, with zeal, integrity and patriotism. The Executive is assured of these virtues in the representatives of the nation, and they may expect, on his part, to receive the aid which his experience in the administration may allow him to afford, and that their decisions shall be faithfully executed.

FRANCISCO DE PAULA SANTANDER.

Bogota, January 2, 1825—15.

Domestic State Papers.

Message from the President of the United States, transmitting a report of the examination which has been made by the Board of Engineers, with a view to internal improvement, &c.

To the House of Representatives of the United States:

I herewith transmit a report from the Secretary of War, with a report to him by the Chief Engineer, of the examination which has been made by the Board of Engineers for Internal Improvement, in obedience to their instructions, of the country between the Potomac and Ohio Rivers; between the latter and Lake Erie; between the Allegheny and Schuylkill Rivers, the Delaware and the Raritan; between Buzzard's and Barnstable Bays any the Narragansett Roads, and Boston Harbor, with explanatory observations on each route. From the views which I have taken of these reports, I contemplate results of incalculable advantage to our Union, because I see in them the most satisfactory proof that certain impediments, which had a tendency to embarrass the intercourse between some of its most important sections, may be removed without serious difficulty; and that facilities may be afforded, in other quarters, which will have the happiest effect. Of the right, in Congress to promote these great results, by the appropriation of the public money, in harmony with the states to be

effected by them, having already communicated my sentiments fully, and on mature consideration, I deem it unnecessary to enlarge at this time.

JAMES MONROE.

Washington, February 14, 1825.

WAR DEPARTMENT,
February 12, 1825.

SIR: I have the honour to present, herewith, a communication from the Chief Engineer, submitting to this department the proceedings of the Board of Engineers for Internal Improvement, under the act of Congress passed the 30th of April, 1824, authorizing the Executive to cause to be procured the necessary surveys, plans, and estimates, upon the subject of roads and canals. The reports are very full, and in detail; the Board have reported favorably as to the practicability of passing the summit level between the waters of the Potomac and the Ohio, by means of a canal, and that it may be effected at a small expense, compared with the advantages expected to result from its execution, in a national and commercial point of view.

I have the honour to be, very respectfully, sir, Your obedient servant,

J. C. CALHOUN.

To the PRESIDENT *of the United States.*

ENGINEER DEPARTMENT,
Washington, February 12, 1825.

SIR: I have the honor of laying before you the proceedings of the Board of Engineers for Internal Improvement, under your instructions of the 31st of May and 29th December, 1824, of which copies numbered 1 and 2 are enclosed, directing an examination to be made of a route for a canal communication between the tide waters of the Chesapeake and the Ohio rivers, and between the Ohio and Lake Erie; also, in relation to other examinations of routes for canals under other instructions. These proceedings are contained in the joint letter of the Board to this department, dated 2d of February, 1825, a copy of which, numbered 3, is enclosed; also, in the report of Gen. Bernard and Col. Totten, and in the separate report of Mr. Sullivan, of the former of which, marked A, and the latter marked C, copies are transmitted herewith.

I have the honour to be, very resspectfully, sir, your obedient servant,

ALEX MACOMB.
Maj. Gen. Chief Eng

Hon. J. C. CALHOUN,
Secretary of War.

ENGINEER DEPARTMENT,
Washington, May 31, 1824.

GENTLEMEN: I am directed, by the Secretary of War, to inform you, that the President has, under the authority of the act of Congress, dated the thirtieth of April, 1824, appropriating $30,000 for the purpose of procuring the necessary surveys, plans, and estimates, upon the subject of roads and canals, appointed you as a Board of Internal Improvement, to superintend the execution of the provisions of the said act. There will be attached to the Board, for the present, Major Abert of the Topographical Engineers, with five assistant lieutenants; Capt. M'Niell, of the same corps, with an equal number; and Mr. Shriver, who is well acquainted with the localities of the country, and who is authorized to employ, under your directions, five citizen surveyors. Capt. Poussin, of the Topographical Engineers, and Lieutenants Courtenay and Dutton, of the corps of Engineers, will be immediately attached to the Board in its operations. The officers detailed for service, and the citizens employed, will report to the board for orders. The rules and regulations established in the prosecution of the survey of the coast, will apply in the disbursement of the appropriation, and the compensation to be allowed the officers of the army, who may be detailed for service under the act. The Board will observe the same rules in reporting, from time to time, the progress made in the execution of the duties assigned to them.

The Board will proceed to make an immediate reconnoissance of the country between the tide waters of the river Potomac, and the head of steam boat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining the practicability of a communication between those points, of designating the most suitable route for the same, and of forming plans and estimates in detail, of the expense of execution.

It is very desirable that the report should be received, on this important line of communication, in time to be submitted to Congress at their next session. The Board will accordingly use every possible exertion to effect that object.

I have, &c.

ALEX. MACOMB.
Maj. Gen. Chief Engineer.

To General BERNARD, *Assistant Engineer,*
Lieut. Col. TOTTEN, *of the corps of Engineers.*
JOHN L. SULLIVAN, Esq. *Civil Engineer.*

ENGINEER DEPARTMENT,
Washington, Dec. 29, 1824.

GENTLEMEN: The Board of Internal Improvement will, forthwith, prepare a Report of their proceedings, under instructions communicated by order of the Secretary of War, by this Department, dated the 31st of May last, and subsequently in relation to Internal Improvements. The Board will state their opinion as to the practicability of the several routes for canals which they have examined, should the examinations have been sufficient to justify the Board in forming their opinion; but, where the Board have not been able to decide definitively on any particular route, they will express their impressions of the importance of that route, or any other property or advantage which such route may have presented to the view of the Board, or other observations which the Board may deem proper to make in relation thereto. When the Board shall decide favourably in regard to any of the routes, they will, in like manner, express their opinion fully, with such observations on the advantages and benefits which may be expected to arise from the construction of the canal.

The Board will also report the operations of the Topographical Engineers and Surveyors, connected with the examinations of the Board, as far as the state of their work will permit.

The Secretary of War is desirous of receiving your report as early as practicable, in order to lay it before the present Congress. I have, &c.

ALEX. MACOMB,
Maj. Gen. Chief Engineer.

To Brig. Gen. S. Bernard,
Lt. Col. J. G. Totten,
J. L. Sullivan, Esq.
Board of Internal Improvement, Georgetown, D. C.

WASHINGTON CITY, *Feb. 3d*, 1825.

SIR: The Board of Internal Improvement have the honour to transmit two reports on the proposed canal communication between the tide water of the Potomac and the Ohio river—between the Ohio and Lake Erie; between the Allegany and Schuylkill, or tide water of the Susquehanna; between the Delaware and the Rariton; between Buzzard's and Barnstable Bays, and between Narragansett Roads and Boston Harbor. Accompanying these reports, will be found a letter from Dr. Howard, on his reconnoissance of the country south of the Glades; a memoir on part of the Allegany river; a memoir by each of the chiefs of brigade, viz: Major Abert, Captain McNeill, and Mr. James Shriver; a letter from Lieutenant John N. Dillahunty; a copy of the records of the Board in relation to the Ohio and Lake Erie canal routes, and nineteen maps, general and particular, of the several sections of country explored and surveyed, of which the following is a list:

No. 1. Survey of part of the route of the Potomac canal, in 1824, by J. J. Abert, Major and T. E. assisted by Lieutenants Swift, Macomb, Bennet, Long, and Wilson.

No. 2. Maps of the eastern section of the summit level of the Chesapeake and Ohio Canal, surveyed by Wm. Gibbs McNeill, Captain U. S. Topographical Engineers, Lieuts. Lewis G. De Russey, Wm. Cook, Isaac Trimble, R. C. Hazzard, John John N. Dillahunty, John M. Fessenden, W. G. Williams.

No. 3. Profiles attached to Captain McNeill's map of the summit level; numbered 2.

No. 4. Profiles attached to Captain McNeill's map of the summit level; numbered 2.

No. 5. Profiles attached to Captain McNelll's map of the summit level; numbered 2.

No. 6. Profiles attached to Capt. McNeill's map of the summit level; numbered 2.

No. 7. Profiles attached to Captain McNeill's map of the summit level; numbered 2.

No. 8. Profiles attached to Captain McNeill's map of the summit level; numbered 2.

No. 9. Plan of a proposed summit level of the Ohio and Chesapeake canal, between the Little Youghiogany and Crabtree creek, by Mr. Howard, assistant Civil Engineer.

No. 10. Profile of the surface of the ground over a proposed summit level of the Ohio and Chesapeake canal, by Mr. Howard, assistant Civil Engineer.

No. 11. Map of surveys of the western section of the summit level of the Chesapeake and Ohio Canal, by James Shriver, assistant Civil Engineer.

No. 12. Topography of the map of surveys, by James Shriver, assistant Civil Engineer.

No. 13. Profiles attached to Mr. James Shriver's map, numbered 11.

No. 14. Profiles attached to Mr. James Shriver's map, numbered 11.

No. 15. Profiles attached to Mr. James Shriver's map, numbered 11.

No. 16. Map of the country between Washington and Pittsburg, showing the proposed routes of the Chesapeake and Ohio Canal, compiled by E. H. Courteney, Lieut. Corps Engineers.

No. 17. Map of the country between Pittsburg and Lake Erie, showing the proposed routes of the Ohio and Erie Canal, compiled by Mr. Howard, assistant Civil Engineer.

No. 18. Map of the country between Pittsburg and Philadelphia, showing the route of a proposed Canal from the Ohio to the Delaware, compiled by George Dutton, Lieut. Corps of Engineers.

No. 19. Plan and profile of a survey and level for the proposed canal between Buzzard's and Barnstable Bay, surveyed September, 1818 by L. Baldwin—copied by Lieut. Fessenden, of the Artillery.

In execution of the orders of the Secretary of War, communicated in your letter of the 31st May last, "to make a reconnoisance of the country between the waters of the Potomac and the head of steam boat navigation of the Ohio, and between the Ohio and Lake Erie, for the purpose of ascertaining the practicability of a communication between these points; of designating the most suitable route for the same, and of forming plans and estimates, in detail, of the expense of execution;"

the Board proceeded from the seat of government, through the portion of country indicated therein. Having deliberately examined every local circumstance on that part of the Allegany mountain which lies between the head waters of the Potomac and those of the Youghiogany, a branch of the Monongahela, the Board prepared instructions for the preliminary surveys and measurements to be executed by the Topographical Engineers and other officers and gentlemen attached for this service; and having now maturely considered the circumstances observed by them personally, and carefully studied the results of such of these preliminary surveys as are completed, *they are decidedly of opinion that the communication is practicable.*

The Board, on viewing the country between the Ohio and Lake Erie, along various lines indicated by public opinion, became possessed of such facts as place the practicability of canalling, from the head of steam boat navigation, in the Ohio, to Lake Erie, beyond all doubt. The information collected by the Board is not, however, of a nature to enable them to decide which of the several routes deserves a preference; and a definitive choice can only be made after the several surveys, indicated by the extract from the record of the Board, herewith, shall have been executed.

In further execution of orders, the Board repaired to the state of Massachusetts, and viewed the ground between Buzzard's and Barnstable Bays, where the isthmus of Cape Cod is not only narrow, but so low, compared with the adjacent country, as to have attracted public attention to this improvement, at an early period. Aided by the maps and reports heretofore made of this ground, at the public expense, and by maps and investigations which had been made more recently, at private expense, the Board are of opinion that this canal might be opened, at least as deep as low water, at no extraordinary cost. The tide rising from eight to ten feet on the Barnstable side, this depth of water might be carried through the canal. The locks, on the Barnstable side, to be protected by a breakwater, or pier.

The board also made a reconnoissance of the ground between Narragansett bay and Boston harbor: likewise, with the advantage of knowing the result of previous surveys, under the authority of the state government, whence they infer that further investigation may show this communication to be practicable.

In execution of the orders of the Secretary of War, requiring a co-operation with the canal commissioners of the state of Pennsylvania, the board examined the whole route of the proposed canal, from the Allegany to the Schuylkill. From observations made by the board along this line, and from surveys and levellings, since made by the Pennsylvania commissioners, the board are inclined to believe in the possibility of this work; but they think that further investigations are necessary to the definitive settlement of this question.

The co-operation of the board, with the commissioners of the state of New Jersey, resulted in a strong conviction of the practicability of a canal communication between the Delaware and the Rariton, by leading the water of the former, from about twenty-six miles above the city of Trenton, to the summit ground between Trenton and Brunswick; and that the abundance of the water of the Delaware will supply a canal, of dimensions adapted to the vessels navigating the great rivers and bays of the sea coast. The board are, however, of opinion, that, previous to fixing the exact route of the canal, lines should be run from the vicinity of Bordentown, across the summit, to the lowest point on the Rariton, to which a canal can, with due economy, be extended, with a view to avoid as much of the difficult tide navigation of the two rivers as possible.

The board has the satisfaction to acknowledge the zeal, perseverance, and ability, with which all the officers of the two corps of engineers, and other gentlemen attached to the service, have fulfilled their duties, to the extent which the time, and the season of the year permitted. The unfinished parts of their instructions comprehend the eastern section of the Ohio and Chesapeake canal, from Cumberland to tide, some lines on the summit, and the whole western section.

We have the honour to be, very respectfully, your obedient servants,

J. G TOTTEN, *Maj. Eng. Bt. Lt. Col.*
S. BERNARD, *Brig. Gen.*
JNO. L. SULLIVAN,
Members of the Board of Internal Improvement.

To Bt. Maj. Gen. ALEX. MACOMB,
Cdt. Com. U. S. Engineers.

A

Report of General S. Bernard, and Lieut. Col. J. G. Totten, members of the Board of Internal Improvement, on the several Canal routes examined in 1824, *by orders from the War Department.*

The routes for canals which have been successively examined during the late season, by orders from the War Department, are as follows:

1st. One to unite the Chesapeake and Ohio, through the Valley of the Potomac, on the eastern, and that of the Youghiogany on the western side of the Alleghany Mountain.

2d. One to unite the Ohio with Lake Erie, through the Valley of Big Beaver Creek, on the southern side, and several directions across the country which slopes to the Lakes, on the northern.

3d. One to unite the Ohio and Schuylkill, through the Valleys of the Alleghany river, Kiskimintay, great and little Conemaugh rivers, on the western side, and Juniatta and Susquehannah, on the eastern, to a point below Harrisburgh, and from thence to Philadelphia, through Lancaster county.

4th. One to unite the Delaware and Raritan, through the Valleys of Crosswick Creek, and across the Assunpich, on the western side, and the Valley of Lawrence's Brook, on the eastern.

5th. One through the isthmus of Cape Cod, from Hyannus harbor to Barnstable harbor.

6th. One to unite Buzzard's Bay and Barnstable Bay, by Monument river, and Scussett river.

7th. One to unite Narragansett Bay and Boston harbor, from Taunton river to Weymouth landing.

This report will comprise the successive examination of each of these routes; but, in the first place, it will be proper to indicate the series of operations which the Board have adopted to arrive at a definitive result, in the formation of the system entrusted to them.

The complete *project* of a canal requires great researches, and a careful investigation of its smallest details. The first operation must be to reconnoitre the ground at sight, and thus investigate, in a general manner, the main features of its hydrography and topography; this can only give general results, and approximated conjectures, more or less exact; accurate surveys must afterwards ascertain the positive facts, disengaged from all speculative ideas. Thus, 1. To reconnoitre the ground. 2. To survey accurately its topographical features, and measure its water-courses, to ascertain their sufficiency to feed the projected canals; such are the preliminary operations which must precede the more minute details of the *project*.

The general facts established by these preparatory operations, enable to indicate approximatively the route which the canal must follow. Then we must trace its directing line on the ground itself, and, with the level in hand, bend it to every local circumstance. The route of its feeders, the capacity of its *reservoirs*, the location of its locks, and the system to adopt in varying their lifts; the location of its dams, tunnels, and culverts, must be determined at the same time; the nature of the soil must be ascertained, and the feeding water-courses accurately guaged, when they are at the highest, and when they are at the lowest stage. This second series of operations determine the final location of the line of canal, and ascertains the several works, in earth, timber, and masonry; which will be required; as well as the quantity and distribution of the waters, which the localities afford to feed the different levels, in an equal and sufficient manner.

These being ascertained, the only remaining operations are, to draw these several works of earth, timber, and masonry; calculate their dimensions; fix their construction, and the nature and manner of employing the materials required for this purpose; and, lastly, to estimate exactly their cost, and draw up the detailed statement of it.

By following the successive series of operations which we have just analyzed, nothing is left to conjecture; every part of the work is studied and ascertained, and no chance is left for mistakes of facts, or miscalculations, to endanger the success of its completion. This regular mode of proceeding is the surest way to avoid those illusive deceptions, from whence such works have so frequently failed. The general project corresponds in its results with the details; the whole combines economy, solidity, and durability, and the estimates being founded upon positive and ascertained facts, their accuracy may be depended upon.

Upon these principles, the Board have divided the task which was confided to them, in the following manner:

1st. Reconnoitering and making the preparatory survey of each project.

2d. Tracing it in detail on the ground.

3d. Drawing the works, and ascertaining their estimate.

Passing to the successive examination of the several routes for canals mentioned above, we will begin by that which is destined to unite the Chesapeake and Ohio.

CHESAPEAKE AND OHIO CANAL.

This Canal may be divided in three sections, eastern, middle, and western. The eastern section extends from the tide-water in the Potomac, to the mouth of Savage river, in the northern branch of the Potomac. The middle section extends from the mouth of Savage river, in the Potomac, to that of Bear Creek, in the Youghiogany. The western section, from the mouth of Bear Creek to the Ohio, at Pittsburgh.—*(See maps and profiles from No. 1 to No. 16.)*

EASTERN SECTION.

This section ascends the valley of the Potomac; as the several ridges which that river traverses and breaks through, oblige to follow its course, without any deviation, the side on which it should ascend along the river, is the only choice left to the Engineer; we will, therefore, compare the respective facilities for receiving the bed of a canal, which exists on each of those sides.

From Georgetown to the Little Falls bridge, the northern shore of the river is flat, whilst, on the southern shore, the mountain exteads closer to the stream, and is more abrupt.

From the Little Falls to the Monacacy, the northern shore is very rugged, but from the Monacacy to Harper's-Ferry, it offers a succession of flats and bluffs. The southern shore on that whole extent, is very rugged, its banks of red slate hang perpendicularly over the stream in several places.

From Harper's-Ferry to Shepherdstown, both shores present undulating flats, and a soil easy to work. The same nature of ground runs from Shepherdstown to Williamsport.

From Williamsport to Hancock, the northern shore presents extensive flats, whilst the mountain on the southern shore stretches closer to the bed of the river.

From Hancock to Town Creek, the northern shore is flat, to the promontory formed by Sidelong Hill, and from thence presents a succession of flats to Town Creek. The southern shore offers no greater facilities, except in front of Sidelong Hill.

From Town Creek to Old Town, the flats on the northern shore are only interrupted by a precipitous bluff, on an extent of about 300 yards. The southern shore presents no advantages over it.

From Old Town to Cumberland, the northern shore is flat, except for one mile along Alumrock, and the same extent along Braddock's Hill.

From Cumberland to the mouth of Savage river, the valley grows narrower, its flanks close on the bed of the river, and the northern shore is little better than the other.

This short analysis is sufficient to show that the northern side of the valley offers the best ground for receiving the bed of a canal. Some portions of the southern bank might be more favourable than the portions of the northern shore which face them; but, in order to render this advantage available, it would be necessary to cross the river frequently by aqueducts, which would cost more than the expense required to subdue the obstacles of the northern shore. Another important consideration, which should determine our preference of it, is its exposition to the south, by means of which the canal will be earlier and longer navigable, and less subject to be seized by sudden frosts in spring and autumn.—To extend the advantages of the canal to the inhabitants of the southern shore of the Potomac, it will be proper, in the project, to trace the works required, in order to unite with the canal the tributary streams which join it on that side. Those streams might thus contribute to feed the canal, and extend the benefits of its communication.

From the mouth of Savage river to Georgetown, the Potomac breaks through the several ridges which run parallel to the Alleghanies, and receives the tributary streams which run between them, from the north and from the south. Wherever the river breaks through these ridges, its navigation is interrupted, by falls or rapids.

The art of the engineer must avail itself of these falls, by erecting dams at those places, to raise the waters and form reservoirs, that may feed the canal. That same art must, also, make the tributary streams of that river, contribute to the same purpose, and convey into the canal the surplus of their waters, and the produce of their valleys.

In proceeding from west to east, the principal ridges, which are thus broken through by the Potomac, are, Will's mountain, Evit's mountain, Rugged mountain, Sidelong hill, North mountain, South mountain, and Cotoctin mountain. The shores are most rugged and precipitous at the spots where the river breaks through them; the intermediate parts answer to the valleys, which run between these ridges—they are generally flat, and offer a soft and rich soil, perfectly adapted to the purposes of a canal.

The main falls of the Potomac are at Harper's ferry, where it breaks through Elk and South mountains, at the rupture of Rugged Mountain; at that of Sidelong hill, the falls of Green spring at the rupture of North mountain; the Hook falls, at the rupture of Cotoctin mountain; the Seneca falls, Great falls, and Little falls. Besides these, it presents, above Harper's ferry, several rapids, whose fall is less considerable and does not deserve a particular notice with respect to our subject.

The tributaries, from the northern bank of the Potomac, whose waters might feed the canal, are from west to east: Savage river, George's creek,

Conococheague, Antietam creek, Cotoctin creek, and the Monocacy river.

The tributaries, from its southern bank, are, the South branch, Great and Little Cacapon, and Shenandoah. The waters of the Potomac do not rise at fixed periods; they generally, however, attain their greatest elevation in the months of March and April, whilst from June to September, they are at their lowest stage. In the dryest seasons, the higher parts of its bed, do not present above 18 inches in depth, as in all other rivers, the middle parts of its course rise more than the upper or lower parts. At Cumberland, it rises about 12 feet; at Hancock, 25 feet; at Williamsport, 30 feet. From thence, to the Little falls, the waters rise less and less. It generally freezes in January and February.

From the surveys of Messrs. Moore & Briggs, the distances from Cumberland to the bridge of the Little Falls, have been found as follows:

From the mouth of Savage river to Cumberland, (Major Abert's survey,)	27½ miles.
From Cumberland to the Great Cacapon,	54½
From the Great Cacapon to Conococheague,	33½
From Conococheague to Harper's Ferry,	38¾
From Harper's Ferry to the Great Falls,	46¼
From the Great Falls to tide-water,	9
	209½ miles.

The general descent of its fled is, nearly as follows:

From the mouth of Savage river to Cumberland, (Major Abert's survey,)	327½ feet.
From Cumberland to tide-water,	537
	864½ feet.

Such are the local features of the valley, through which this section of the canal, east of the Alleghany, must be directed. We will now proceed to those preparatory operations, which were necessary to determine the route through which this section must pass.

The execution of these operations and preparatory surveys, were confided to the talents of Major Abert, of the Topographical Engineers of the United States' Army. He was assisted by the Lieuts. of Artillery, Swift, Macomb, Bennet, Long, and Wilson. The Board having left Washington in the beginning of June, the necessary instructions could not be sent to Major Abert till the 30th of that month, when they had examined the ground. That officer was, meanwhile, making the necessary preparations for rendering himself, with his assistants, on the spot; and, in the first days of July, began the operations entrusted to him. But in the middle of August he was obliged to suspend them: the country had become unhealthy, and his officers were all taken sick. The result of these operations, as far as he could bring them to a conclusion, in the short time whilst he could remain on the ground, is joined to this report; and, what he performed in that time proves, that, in beginning his labours early next spring, he will be enabled to complete, during the next season, the preparatory surveys of that section of the canal.

These surveys will determine the data which must guide us in adapting its line exactly to the ground, and fix the precise position of its several works. As to the practicability of this section, there can exist no doubt. The ground offers no difficulties which may not be overcome, at a moderate expense. The tributary streams of the Potomac provide supplies beyond what the consumption of the canal requires; and the Potomac itself, by erecting dams across the summits of its rapids, will afford additional aid for this purpose. In indicating the probable general route of this section, we shall report the operations and surveys made, and those which remain to be performed, before its line can be fixed in a final and definitive manner.

These preparatory surveys have given the following results, as to the portion of the canal between the mouth of Savage River and Cumberland.

From the mouth of Savage River, in descending the Potomac, its northern shore presents a perpendicular bank of a compact mass of sandstone; the canal must therefore run for half a mile along the southern shore, when stopped by a perpendicular bluff of Knobly mountain, it crosses over and follows the northern shore for one mile. Here another perpendicular mass of rocks compels it to pass to the southern side, from whence it crosses over to the northern, at Westernport, at the mouth of George's Creek. From the mouth of Savage River to that of George's Creek, the canal must therefore cross the Potomac four times, in a space of two miles, unless the expense of running it along those obstacles, on an embankment supported by dry walls, should prove less than that of constructing four aqueducts.

From Westernport to W. R. Dawson's, on a space of eight miles, the canal follows the northern shore of the valley. This portion will require several deep cuts, and it will be frequently necessary to cut a shelf in the flank of the mountain, to run the canal upon.

From W. R. Dawson's to S. Cresap's, the distance is four and a half miles: A little below Dawson's, Fort Hill, a high and rocky mountain, fills up the northern shore, and compels us to run the canal across the river; and as in two other places, that hill closes the passage, we must cross the Potomac twice, between Dawson's and Cresap's, unless it be found less expensive to continue the canal on an embankment round these obstacles. It was endeavoured to turn round the north of Fort Hill, along the road from Dawson's to Tenyard, but the ground was found too high, its summit being elevated 342½ feet above Dawson's.

From Cresap's to Armstrong's, the canal follows the northern shore, through a rich, alluvial, and very favorable soil. From Armstrong's, to a point four and a half miles below it, we should cross the Potomac four times, to keep in the most favourable ground. But the expense of those acqueducts must be compared with that of the deep cuttings and wallings which would be required to avoid them.

From thence to Lynn the canal follows the northern shore, on a distance of three and three-quarter miles. It meets with only two obstacles: a spur of slaty rock, and a mass of calcareous stone, which hang perpendicularly, but for a short space over the river, otherwise the ground is favorable.

From Lynn the canal may turn round the north of the hill on which Fort Cumberland is built, and cross Wills Creek, above the bridge, or turn round its south, along the Potomac and Wills Creek, to cross at the same place, or below the bridge; the distance by the first route would be half a mile.

Such is the general direction of that section, from Savage River to Cumberland. Its length is from 27 to 28 miles, and its fall 327 1-2 feet. To keep on the best ground in the valley, it should cross the Potomac 12 times; but in drawing up the final project, it will be necessary to compare the expense of those aqueducts, with that which will be required to overcome the obstacles which compel to cross so often. We have every reason to believe, that a much less number of aqueducts will then be thought sufficient.

The labours of the brigade, charged to execute the surveys of the eastern section, having been suspended by sickness, as stated above, they did not proceed any further. The waters from Savage River to Cumberland have not been guaged; the extent of the reservoirs, their location, and the profile of their dams, have not been fixed. As to the location of the locks, it can only be determined upon when all the preparatory surveys of the canal are concluded, and a general system adopted to connect them together.

The valley of the Potomac, above Cumberland, is well timbered, and fine grained and compact sandstone abounds all through it. Clay is abundant, but the highest point, where limestone is found, is one and a half miles below Westernport. Excellent building stone, a great variety of sandstone, nd coal, are found in every part of the mountains, which bound the head of the valley.

In descending from Cumberland, the canal will cross Evet's creek; and as this stream gives a constant supply, a feeder may bring its waters to it, and the minimum quantity which it may furnish, must be accurately guaged.

From thence to Braddock's Hill, it will follow the left shore: but if it ran farther on that side, shelves should be cut through Braddock's Hill, Alum Hill, and Old Town Bluff, or it should turn round them on embankments, supported by walls. At this point, the two shores should be surveyed with care, to fix the best line on which the canal should be run. 1st. It might run, as just mentioned, in front of those three bluffs. 2d. It might turn round the north of Alum Hill, and the front of the two others. 3d. It might cross the Potomac above Braddock's Hill, follow the right shore, and cross over below Old Town Bluff, and above South Branch Cape. 4th. The Potomac, from Braddock's Hill, to the ledges below the South Branch, might, by a dam run across those ledges, be formed into a basin, serving as a haven for the boats descending the South Branch, feeding the lower parts of the canal, and forming a part of it. Thus, the expense of the aqueducts, and of four or five miles of canal digging, might be avoided; the post track in this case, would remain on the left shore. Surveys and levels, by giving positive data, can alone determine which is the best of these courses. Whichever is adopted, the waters of the South Branch must be brought to the canal, and the feeder connecting them be made navigable. In the first or second hypothesis, the feeder should cross the Potomac above or below the mouth of South Branch; in the third, it should fall in the canal above the mouth of that river, as it would perhaps be shorter; in the fourth, it should enter the Potomac to the west or east of South Branch Cape, above the dam, or a dam and lock might be erected at the mouth of the South Branch itself.

From Town Creek to Sidelong Hill Creek, the narrow strip which runs along the left shore, offers the best ground for the canal, which must cross Town Creek and 15-mile Creek, on aqueducts.—As the former offers a constant supply, it should be guaged, and a feeder run to lead its water into the canal. If Sidelong Creek afford the same advantage, it should be used in the same manner. The long and perpendicular bluff of Sidelong Hill compels to cross the Potomac above the mouth of this creek, and follow the right shore till you reach opposite Conoloway Creek. Here the canal may pass to the left. Indeed, from the South Branch to this spot, and even to Harper's Ferry, it will be proper to examine the right shore, and ascertain whether it is not preferable to the other. Supposing the proposed directions adopted, the canal will require three aqueducts, two over the Potomac, and one over the Great Cacapon. This river and the Conoloway may supply the canal with their waters,

and of course must be guaged, and feeders led from them.

From the Conolaway to the Conecocheague, at Williamsport, the canal may follow the left shore, crossing the Conecocheague on an aqueduct, that stream should be guaged, and a feeder led from it. From thence to the foot of Elk Mountain, in front of Harper's Ferry and the Shenandoah, it continues on the same side, crossing the Hatictain creek. Here we may 1st, either lead the canal round the front of the Bluff, on a shelf or embankment, or, 2d, run a dam across the ledges, half a mile below Harper's Ferry, forming a basin for the boats descending the Shenandoah, and a reservoir to supply the lower parts of the canal—the upper part descending by locks, from Elk Mountain, into it. In the first hypothesis, the waters of the Shenandoah should supply the canal. It should be guaged, and a feeder, crossing the Potomac on an aqueduct, led to it; that feeder should be navigable, to favour the passage of the Shenandoah boats into the canal.

From Elk Mountain to the Monocacy, the left shore offers the best ground, though it presents two formidable obstacles—South and Cotoctin Mountains. The canal must be led along their fronts, on shelves or embankments, and dams must be erected at the South Mountain Falls, and Cotoctin Mountain Falls, or Hook's Falls, where the river breaks through the ridges. They will form reservoirs for the lower portions of the canal. It will cross the Monocacy on an aqueduct. That river must be guaged, and a feeder led from it. Griffin's Falls offer a favourable position for a reservoir, by throwing a dam across them.

From the Monocacy to the Great Falls, the canal must follow the stony and perpendicular bank, which leaves a narrow strip of flats on the left shore; shelves cut in the rock, and embankments will be frequently required, especially 'twixt the Seneca and Great Falls. The level of this portion of the canal must be kept as high as possible, in order to run it above, and to the north of the rugged banks which lie between these falls. A dam across the Great Falls might form a reservoir for the lower portions of the canal: a wing dam may also be required at Seneca Falls. It is desirable that the works at Great Falls should not interfere with the canal which at present turns them on the right shore, as it may be useful for floating the rafts and timber, when the navigation of the Potomac will be improved.

The canal then continues along the left shore, winding round the bank which extends from the Great to the Little Falls, and from thence along the flats of the same shore, to the head of tide water in the Potomac. If, however, it be found possible to open a direct communication from Seneca Falls to Washington, the obstacles which lie between the Great and Little Falls, may perhaps be avoided.—To ascertain this fact, a level should be run between the Seneca Falls and the Rock Creek which divides Georgetown from Washington. A ravine, running to the north of the Great Falls, seems favourable to this line. It should be surveyed with care, and a level run on the north ridge of the height which runs from the Great Falls to Washington, and on the eastern point of which is built the town of Georgetown.

MIDDLE SECTION.

This section, from the mouth of Savage river, in the North Branch of the Potomac, extends to the mouth of Bear creek, in the Youghiogheny, on the west side of the Alleganies. It includes the summit level of the canal, and from the complicated topography of the ground, the height which must be overcome in a short space, and the difficulty of securing a sufficient supply of water, in dry seasons, at such an elevation, presents the greatest difficulties which occur in the whole project.

The Little Back Bone Ridge divides the waters, which, in that part of the Alleganies, runs east and west; it runs parallel to the Great Back Bone, through which Savage river forces its way, and the canal must, absolutely, pass through this gap. Between those two ridges run Crabtree creek, from S. W. to N. E. and Savage river from N. W. to S. E.; the former falling into Savage river four and a half miles above its mouth in the Potomac. From the west side of the Little Back Bone Fall, Deep creek, and the Little Youghiogheny, the latter runs from E. to W. and, after forcing its way successively through Hoop-Pole Ridge, and Roman Nose Ridge, joins the Great Youghiogheny. Deep creek runs at first to the north, crossing Hooppole Ridge, and Negro Mountain; then, intercepted by Marsh Mountain, it turns west, and falls into the Youghiogheny. The gap through which it forces its way across the Hoop Pole Ridge, is only sixty-six yards wide, and is called the Narrows.

The heads of the Little and Great Youghioghenny, to some miles above the point wher they join, in a single stream, run through marshy meadows known by the name of Glades. The valleys o Deep creek, and its tributaries, offer the same features as low down as Marsh Mountain, from whence their course continues in a deep and narrow ravine, with steep, and rugged banks. The bottoms of these glades, which has been sounded in several places, present the following layers: 1st, Rich loam; 2d, Sand, coloured by oxydated iron; 3d, Vegetable detritics; 4th, Alluvial clay; 5th, A horizontal bank of sand stone, four or five feet below the surface, on which the other layers all lie.

The Great Youghiogheny, after receiving the Little Youghioghenny, and Deep creek, receives Bear creek. The east branch of this last stream rises on the west side of Negro Mountain, and runs from south to north till it forces its way through Keyser's Ridge; it then turns suddenly east, and, after forcing through Winding Ridge, falls into the Youghiogheny. Its west branch springs from the west side of Keyser's Ridge, and joins the other at the gap where it forces its way through Winding Ridge.

Savage river runs on a bed of sand stone, its course is rapid, and broad flats extend along both its banks. Crabtree creek is the chief tributary stream which joins it; it runs between the Great and Little Back Bone, and is formed by the junction of Crabby's Arm, and Wilson's Fork, which take their sources in that part of the Little Back Bone which divides their ravines from the valley of the Little Youghiogheny. Crabby's Arm runs in a wnarro vale, but which is, however, wide enough to receive a canal; its bottom is a black alluvial soil, and its banks present a gentle slope. Wilson's Fork is more rapid, but runs in a wide and well wooded valley. These two streams join at Swan's Mill, from whence they impetuously descend on a bed from ten to twenty yards wide; they are interrupted in two or three places by perpendicular falls, seven or eight feet high, and frequently by smaller rapids, which fall from four to five feet.—From the Great Back Bone, Crabtree creek receives several tributaries; they are torrents which fall into it with great impetuosity. On both sides of its valleys run flats, eight or ten yards wide, which are intersected by rugged bluffs, from 100 to 200 feet high, which divide them into isolated portions, the bluffs on one side of the stream, lying, in general, opposite to the flats on the other, and the two banks presenting an alternate succession of the same features.

Such are the main streams which, in this section, descend from the two sides of the Alleganies.

To conduct the canal across this summit ground, we must 1st, Select the best passage for it through the Little Back Bone, by leading it either from the valley of Savage river, to that of Deek Creek, and

from that of Crabtree creek to the same, or from the valley of Crabtree creek, to that of the Little Youghiogheny; 2d, Ascertain which of these passages presents the shortest route from the mouth of Savage river, to that of Bear creek; 3d, Ascertain, as the most essential element of the whole project, whether a supply of water, sufficient for all the purposes of the canal, can be procured at this elevation.

We shall point out the several passages which lead through the Little Back Bone, beginning by those which lead from the valley of Savage river, to that of Deep creek. But, in the first place, it is necessary to state, that a base-mark has been fixed on the bridge of Deer creek, three feet above its bottom; to this have been referred all the levels taken on this section of the canal.

Monroe run, a tributary of Savage river, and Meadow mountain run, a tributary of Deep creek, offer the only ravines through which Deep creek, and Savage river, can be connected. For this purpose, it will be necessary to run a tunnel through the little Back Bone. Supposing its bed on a level with the base-mark, and a deep cut of thirty-five feet at each extremity of it, this tunnel would extend five miles, 833 1-3 yards, in length. The greatest elevation of the ridge, above the bed of the tunnel, would be 213 feet. From its eastern extremity to the mouth of Monroe run, in Savage river, the descent is 983 feet, on a length of five miles 816 2-3 yards. From the mouth of Monroe run, to that of Crabtree creek, in Savage river, the descent is 109 feet, on a length of two miles, 216 2-3 yards. From the mouth of Crabtree creek, to that of Savage river, itself, in the Potomac, the descent is 340 feet, on a length of five and a half miles.—The level of the mouth of Savage river lies, of course, 1,432 feet below the base-mark, and at a distance of 21 miles 327 yards from it, ascending the ravines of Savage river, and Monroe run, and descending those of Meadow mountain run, and Deep creek.

Meadow Mountain Run flows through glades, but Monroe Run falls down a ravine, whose upper portion is very steep and narrow; it widens however, as it descends, and presents a succession of bluffs and flats, which extends to twenty-five yards in breadth, the bluffs hang perpendicularly over the stream. At the mouth of Monroe run, Savavge river is only thirty-three yards wide, and a dam might easily be thrown across to form a reservoir.

This passage is the only one which leads from the valley of Savage river to that of Deep Creek.

We shall now examine those which connect the valley of Crabtree Creek and Deep Creek.

Th- first lies between the middle fork of Crabtree creek, and the Meadow mountain run, and would require a tunnel running under the Little-back bone and Hooppole Ridge. Supposing its bed on a level with the base-mark, and an open cut to the depth of thirty-five feet through the height, the tunnel would extend three miles 1,333 1-3 yards in length. From its eastern extremity to Crabtree creek, in following the windings of the middle fork, the descent is 1,012 feet, on a distance of six miles 1,333 1-3 yards, and from the mouth of the middle fork to the mouth of Savage river in the Potomac, the descent is 420 feet on a distance of six miles 685 yards. The height of the ridge above the bed of the tunnel would be 210 feet; and the ravine of middle fork differs little from that of Monroe Run; its general breadth is about twenty-seven yards, and its banks are rugged. The whole distance from the base-mark to the mouth of Savage river would be, by this passage, nineteen miles 915 yards.

Three passages run through the Little backbone, from three branches of North Glade Run, a tributary stream of Deep Creek, to the valley of Crabtree Greek.

The first opens on the western branch of the middle fork, and would require a tunnel through the Hooppole Ridge. Supposing its bed on a level with the base-mark, and an open cut to the depth of thirty-five feet, through the height, the tunnel would extend three miles 125 1-3 yards in length, and the greatest height of the ridge above its bed would be 144 feet.

From the second branch of North Glade Run, a passage might be opened to the eastern branch of the middle fork, by a tunnel of the same nature, and on the same level as the former; it would extend three miles eighty-three yards in length, and the greatest height of the ridge above its bed would be 184 feet. But from its eastern extremity there would be a descent of 280 feet, on a distance of one mile 366 yards.

From the third branch, a passage might be opened to Rock Camp Run, by a tunnel four miles in length. The greatest height of the ridge above its bed, would be 222 feet; but from its eastern extremity to Crabtree Creek, the descent would be 728 feet, on a distance of two miles 166 2-3 yards, and through a very narrow, rugged, and precipitous ravine.

The north fork of Deep Creek rises near the summit of the Little Backbone, at Whetsall's Springs, 105 feet above the base mark. The spring of Savage Lick Run, a tributary stream of Crabtree Creek, rises opposite to it. A tunnel which would join them, with its bed on a level with the base-mark, and an open cut through the height at each of its extremities to the depth of thirty-five feet, would extend two miles 1,083 yards in length. From its eastern extremity to Crabtree Creek, the descent would be 452 feet on a distance of two miles 100 yards, and the greatest height of the ridge above its bed would be 148 feet.

Three more passages have been surveyed between the tributaries of the north fork, and those of Crabtree Creek.

The first unites Hinch's arm to Glade Road Run, by a tunnel one mile 1,166 yards in length, on a level with the base mark. The distance from its eastern extremity to Crabtree Creek is 1,500 yards, and the greatest height of the ridge above its bed 205 feet.

The two others unite Dry arm and Dewickman's arm, with small ravines of Crabby's arm, a tributary stream of Crabtree Creek, which rise opposite to them. The tunnel which would be required at Dry arm, would extend one mile 916 yards in length, and the greatest height of the ridge above its bed would be 271 feet. The tunnel of Dewickman's arm would extend one mile 683 1-3 yards in length, and the greatest height of the ridge above its bed would be 227 feet. These two tunnels on a level with the base-mark, are the shortest of those that we have enumerated on any of the designated routes of the canal.

Two passages have been surveyed and levelled, to open a communication between Crabtree Creek and the little Youghiogeny: the one from Crabby's Arm, and the other from Wilson's Fork to the latter stream. They would each require a tunnel. Supposing its bed on a level with the base mark, the tunnel from Crabby's Arm would extend three miles, 1,538 yards, and the tunnel from Wilson's Fork four miles 300 yards, in length, with an open cut at each of their extremities, to the depth of thirty-five feet. The greatest heighth of the ridge above the bed of the tunnel from Crabby's Arm, would be 444 feet, and above that of Wilson's Fork 258 feet. The distance from their eastern extremities to Swan's Mill would be two miles with a fall of 114 feet. From Swan's Mill, to the mouth of Crabtree Creek, the descent would be 940 feet, on a distance of seven miles 966 yards; from the mouth of Crabtree Creek, to that of Savage River, in the Potomac, the distance five miles 880 yards, and the descent 378 feet. Thus, from the eastern extremity of the tunnel, to the mouth of Savage River, the total descent is 1,432 feet, on a distance of fifteen miles eighty-six yards, and of these two tunnels, the one by Crabby's Arm is the shortest.

Other passages have also been examined, to open communications between Deep Creek and the waters of the Little Youghiogeny. The bed of the tunnels required for this purpose, was fixed seventeen feet above the level of the base mark. One of these tunnels joined West-lick Run, to one of the branches of the south fork of Deep Creek; its length was two miles 583⅓ yards, and it required a deep cut, on the side of West-lick Run, of the length of one mile 600 yards, and another on the side of South Fork, of the length of two miles 50 yards. Another tunnel might join the Little Youghiogeny itself, to South Fork; it would extend one mile 1,300 yards in length, and require an open cut of one mile 1,566⅔ yards, towards the Little Youghiogeny, and two miles 800 yards towards the South Fork. The height of the ridge, above the first tunnel, would be 143 feet, and above the second, 183 feet. Such are the chief passages through which a communication might be opened between the waters which descend from the eastern and western sides of the Little Backbone. In recapitulating the several routes, by which the canal may be directed through them, we will observe, that they all extend from the mouth of Savage River, either by the valley of that stream, or Crabtree Creek, to the base mark on the bridge of Deep Creek; and that the descent or fall of the canal, by all these routes, is 1,432 feet.

1st. The first ascends by Savage River, Monroe Run, Meadow Mountain Run, and Deep Creek. Its total length, from the mouth of Savage River to the base mark, is twenty-one miles 925 yards. The length of the tunnel, which it requires through the ridge, is five miles 833⅓ yards, and the height of the ridge above its bed, 213 feet.

2d. The second ascends by Savage River, Crabtree Creek, Middle Fork, Meadow Mountain Run, and Deep Creek. Its total length is nineteen miles 915 yards. The length of the tunnel which it requires through the ridge, is three miles 1,333⅓ yards, and the height of the ridge, above its bed, is 210 feet.

3d. The third ascends by Savage River, Crabtree Creek, Middle Fork, the western branch of the same Fork, North Glade Run, and Deep Creek. Its total length is twenty miles 1,128 yards. The length of the tunnel which it requires through the ridge, three miles 125 yards, and the height of the ridge, above its bed, 144 feet.

4th. The fourth ascends by Savage River, Crabtree Creek, Middle Fork, the eastern branch of the same, North Glade Run, and Deep Creek. Its total length is twenty miles 1,306 yards. The length of the tunnel which it requires through the ridge, three miles eighty-three yards; the height of the ridge, above its bed, 184 feet.

5th. The fifth ascends by Savage River, Crabtree Creek, Rock Camp Run, North Glade run, and Deep Creek. Its total length is nineteen miles 680 yards. The length of the tunnel which it requires through the ridge, four miles, and the height of the ridge, above its bed, 222 feet.

6th. The sixth ascends by Savage River, Crabtree Creek, Savagelick Run, North Fork, and Deep Creek. Its total length is twenty-one miles 435 yards. The length of the tunnel which it requires through the ridgde, two miles 1,083 yards, and the height of the ridge, above its bed, 148 feet.

7th. The seventh ascends by Savage River, Crabtree Creek, Hinch's Arm, Glade Road Run, North Fork, and Deep Creek, Its total length is twenty-one miles 1,158 yards. The length of the tunnel which it requires through the ridge, one mile 1,166 yards, and the height of the ridge, above its bed, 205 feet.

8th. The eighth ascends by Savage River, Crabtree Creek, a ravine of Crabby's Arm, Dry Arm, North Fork, and Deep Creek. Its total length is twenty-one miles 1,368 yards. The length of the tunnel which it requires through the ridge, one mile 916 yards, and the height of the ridge, above its bed, 271 feet.

9th. The ninth ascends by Savage River, Crabtree Creek, a ravine of Crabby's Arm, Dewickman's Arm, North Fork, and Deep Creek. Its total length is twenty-one miles 718 yards. The length of the tunnel which it requires through the ridge, one mile 683⅓ yards, and the height of the ridge, above its bed, 227 feet.

From the base mark, the localities of the ground

leave us a choice between three routes, to the mouth of Bear Creek.

The first runs by Deep Creek, Buffalo marsh run, Rocklick run, a tributary stream, to the western branch of Bear Creek, that western branch to its mouth in Bear Creek, and Bear Creek itself to the Youghiogeny

This route crosses by a tunnel, the ridge which divides the heads of the Western and Eastern branches of Bear Creek. This tunnel, beginning at McHenry's, and with an open cut of the depth of 35 feet at its southern extremity near McHenry's, and at its northern extremity, would extend about two miles in length, and the greatest height of the ridge above its bed, supposed on a level with the base mark, would be about 170 feet The whole ground along this route, except where it passes through the gap of Winding ridge, is of a soft and good quality; and its whole length from the base mark, to the mouth of Bear Creek, would be only twelve miles.

A second route might turn round the west of Marsh Mountain, and wind about Panther's Point; it would then turn successively round the heads of the ravines of Hoy's Run, Steep Run, Sang Run, Gap Run, and descend along Friend Run, a tributary of the Western branch of Bear Creek. This route is very circuitous, and in winding round Panther's Point, runs through a rocky and difficult ground. It would only be shortened by running an aqueduct 250 feet high, and above a quarter of a mile long, through the Western branch of Hoy's Run, or a tunnel half mile in length from that Western branch to the head of Steep Run. The height of the ridge above the bottom of that tunnel, would be about 250 feet. A level was also run over a bend of ground at Hoy's pine bottom, to endeavour to shorten it, and to avoid the winding round of Panther's Point, but to run the canal over this line would require a deep cut of 1,431 yards in length, and of the depth of 99.06 feet at the highest point of the ridge. The total length of this route would be 24 miles.

The third route, descending the valley of Deep Creek from the base-mark, might follow the eastern shore of the Youghiogheny to the mouth of Bear Creek, crossing successively, on aqueducts, Hoy's Run, Steep Run, Sang Run, Gap Run, Bear Creek, and the smaller tributary streams of that river. The ground along this route is rocky and difficult for one mile and ¾, from Deep Creek to Hoy's Run; then light and easy for four miles, to Gap Run; then rocky for the space of six miles, following the Western bank of Winding ridge; then for two and a quarter miles light and easy to the mouth of Bear Creek. The total length of this route would be 20 miles.

We have not mentioned a fourth route, which, from the base-mark, running by a tunnel, through Negro Mountain, might unite Deep Creek with the Eastern branch of Bear Creek, because it would require a tunnel of 3 miles in length; and that the height of the ridge, above its bed, would be from 400 to 500 feet in the most elevated portion. The length of this route would also pass 20 miles.

Such are all the routes which lead from the valleys of Savage river and Crab-tree Creek, in passing by that of Deep Creek to the mouth of Bear Creek, in the Youghiogheny. We must now examine those which, departing from the head of Crab-tree Creek, reach the same point in passing by the valleys of the Little and Great Youghiogheny.

For this purpose the canal should follow the valley of Savage river, from the mouth of that stream, and ascend along Crab-tree Creek till it reaches two miles above Swan's mill, where opens the eastern extremity of the tunnel of Crabby's Arm, mentioned page 27, as the shortest of those by which Savage river can be connected with the Youghiogheny. Passing through that tunnel, it would descend the valleys of the little and great Youghiogheny, winding along their eastern side. When it reaches the mouth of Deep Creek, it may follow one of those three directions.

1st. Ascend Deep Creek and Buffalo-marsh Run, following the first of the three routes, which we have just indicated for passing from the base-mark, to the mouth of Bear Creek. This route, as we have seen, presents a tunnel two miles in length: The total distance over which it runs, is as follows:

From the mouth of Savage river to the east extremity of the tunnel of Crabby's Arm,	15 miles 66 yds.

From thence to the mouth of Deep Creek,	22 miles 426 yds.
From thence to the mouth of Buffalo-marsh Run,	6 miles
From thence to the mouth of Bear Creek,	11 miles 440 yds.
Total distance from the mouth of Savage river to that of Bear Creek	54 miles 952 yds.

This route would present two tunnels, one three miles 1,538 yards in length at Crabby's Arm, and the other two miles in length between Buffalo-marsh Run and Rocklick Run—total nearly 6 miles of tunnelling.

2d. The canal might cross Deep Creek, and follow the 2d route indicated for passing from the base-mark to Bear Creek, by winding round Panther's Point, and the heads of the ravines of Hoy's Run, Steep Run, Sang Run, Gap Run and Friend Run, to the western branch of Bear Creek—its total length would be:

From the mouth of Savage river to that of Deep Creek, as above	37 miles 512 yds.
From thence to Bear Creek	17 miles 660 yds.
Total length	54 miles 1172 yds.

This route presents only one tunnel, of the length of 3 miles 1,538 yards, or nearly 4 miles at Crabby's Arm. It may also be shortened, as mentioned above, by an aqueduct ¼ of a mile in length, and 250 feet high, or a tunnel ½ mile in length, with 250 feet of height of ridge above its bed.

3d. The canal might follow this third route indicated above, after crossing Deep Creek, by keeping along the eastern side of the valley of Youghiogeny, and crossing its tributaries on aqueducts. Its total length would be as follows:

From the mouth of Savage river to that of Deep Creek, as above	37 miles 512 yds.
From thence to Bear Creek,	13 miles 660 yds.
Total length	50 miles 1172 yds

This route would require, like the preceding one one tunnel of 3 miles 1538 yards, or nearly 4 miles in length.

From the comparison of these three routes, it is evident that the second is preferable to the first. Their length is nearly the same, but the first requires six miles of tunnelling and two tunnels, whilst the second requires only one tunnel of something less than four miles in length. The third is shorter again by four miles than the second, and passes by the same tunnel. Aqueducts must be constructed on this route to cross Hoy's Run, Steep Run, Sang Run, Gap Run, and Bear Creek; but by the successive dropping of its levels, they will require but a small elevation; and the waters of these runs, and of the Great Youghiogeny, may be raised, and used to feed the canal, an advantage which the other routes do not offer. It should also be observed, that these runs are not above 200 or 300 feet wide at their mouths, in the Youghiogeny. The third route is therefore preferable to the two others, on the hypothesis of uniting the mouths of Savage river and Bear creek, through the valleys of the Little and Great Youghiogeny.

We will now compare this route, which we will call the Youghiogeny route, with those which lead from Crabtree creek to Deep creek.

Nine routes, which all unite at the base mark, have, as we have stated before, been examined for this purpose. Their length varies only from 19 to 22 miles, but their tunnels present a much greater difference. The longest extends 5 miles 333 1-3 yards, or about 5 1-2 miles; and the shortest 1 mile 683 1-3 yards, or about 1 1-3 miles in length. The last should certainly be preferred; its whole length is 21 miles 718 yards; and the greatest height of the ridge, above its tunnel, is 227 feet. We shall call it Dewickman's Arm route.

We have also observed, that there are three routes from the base mark to the mouth of Bear creek. The first runs 12 miles by Buffalo Marsh Run, and Rock Lick Run. It is the shortest, but requires two miles of tunnelling. Were it not for this obstacle, it offers a favourable ground for digging the canal. The second, winding round Panther's Point, and the heads of Hoy's Run, Steep Run, Sang Run, Gap Run, &c. is 24 miles

long, and is objectionable, not only from its length, but from the difficulties which it presents in turning Panther's Point. The third, by the valleys of Deep creek, and of the eastern branch of the Youghiogeny, is 20 miles long; it is shorter by four miles than the second, and requires no tunnelling. In this respect it is superior to the first; for two miles of tunnel costs more than eight miles of canal, which is the difference of their length. The passage of an active trade will also meet with more delay on a tunnel of two miles, unless its dimensions are very large, than on four or six miles of canal. This route possessing, besides, over the two others, the advantage of feeding the canal below the mouth of Deep creek, by raising the waters of the Great Youghiogeny and its tributaries, is preferable to them in all respects.

If we add the 20 miles of this route to the 21 miles 718 yards of Dewickman's Arm route, we shall have for the whole length of the canal, passing along Crabtree creek, Deep creek, and the valley of the Youghiogeny, 41 miles 718 yards, with one tunnel 1 1-3 mile in length, and the height of the ridge above it 227 feet.—We shall call this route Deep creek route, in opposition to the Youghiogeny route.

To decide between these two routes, which alone can enter in competition, we must compare their length, and the time, expense, difficulties, and trouble of their construction, viewed in a general manner.

The length of the Deep creek route is 41 miles 718 yards; that of the Youghiogeny route 50 miles 1172 yards; the former is therefore shorter by nine miles than the other.

The tunnel from Dewickman's Arm on the Deep creek route is 1 mile 683 1-3 yards in length, and the height of the ridge above its bed is 227 feet. The tunnel betwixt Crabby's Arm and the Little Youghiogeny on the Youghiogeny route, is 3 miles 1538 yards in length, and the height of the ridge above its bed is 464 feet. The former requires 2 miles 855 2-3 yards less of tunnelling, and the height of the ridge above the bed of its tunnel is 237 feet less. With respect to the expense of tunnelling, the route by Deep creek is therefore preferable to the other.

As to the deep cuts at each extremity of these tunnels, the deep cut at the western extremity of the tunnel towards the Little Youghiogeny, is 2 miles 930 yards in length. The deep cut, at its eastern extremity, towards Crabby's Arm, is 900 yards. The whole deep cutting on the Youghiogeny route is thus 3 miles 70 yards.

The deep cut at the western extremity of the other tunnel towards Deep creek extends 5 miles 1096 yards. The deep cut at its eastern extremity towards Dewickman's Arm, is 572 yards. Total, 5 miles 1668 yards.

The Youghiogeny route will, therefore, require 2 miles 1598 yards less of deep cutting than the other, at the extremities of its tunnels. But this advantage is not to be weighed with the expense of 2 miles 855 yards more of tunnelling.

In comparing the nature of the soil on each of these routes, and the obstacles which it may present, it must be remembered that their eastern portion, from Savage river to Crabby's Arm, and their western portion from the mouth of Deep creek to that of Bear creek, are the same. In the intermediate space the ground is equally favourable and easy to work on both routes.

On the whole comparison of their respective lengths—of the time necessary to pass through the one or the other of the obstacles which they meet, and the expense and probable trouble of their construction, we believe the Deep creek route preferable to the route by the Youghiogeny.

Our next task must be to compare the supplies of water which the canal may receive on either of these routes, and this will lead us to a detailed investigation of the resources which are offered by the water courses of the country, to feed the middle section, and summit level of the proposed canal.

Savage river and its tributary, Crabtree creek, may feed the eastern branch of the middle section, and the Great Youghiogeny its western branch. The summit level must draw its resources from Deep creek and the heads of the Little and Great Youghiogeny. These streams were all guaged in 1824, at their lowest stage. We will give, in a general manner, the result of these operations: the minimum, in the cubic feet of water, that flows through each stream in a second.

Eastern branch of the Middle Section.

	cub. ft.	100ths.
Savage River gave, on the 28th September, below the mouth of Crabtree creek, in a second,	17	73
Savage River gave, on the 28th Sept. at its mouth, (It had, however, rained this day.)	46	09
Do. Do. 2d September, below Monroe Run,	28	62
Monroe Run gave, on the 28th Sept. at its mouth,	00	33
Do. Do. 16th Sept. do.	2	28
Crabtree Creek gave, on the 14th Sept. at Swan's Mill,	00	97
Middle Fork gave, on the 15th Sept. at its mouth, in Crabtree Creek,	00	84
Rock-Camp Run gave, on the 2d Sept. do. do.	00	12
Savage-Lick Run gave, on the 14th Sept. do. do.	00	33
Crabby's Arm gave, on the 17th August, do. do.	00	24
Wilson's Fork gave, on the 17th August, do. do.	00	35

If we consider, that the water consumed in the lockage of this branch is supplied from the summit level, these streams turned into reservoirs by dams thrown across the tributaries of Crabtree creek and Savage river, above the mouth of that creek, will serve to supply its losses from filtrations and evaporation. Between the mouth of Crabtree creek and the Potomac, on a distance of 5 1-2 miles, Savage river, which gives 17 73 cubic feet, in a second, at its lowest stage, will serve for this purpose. In the remaining 9 1-2 miles from the tunnel to the mouth of Crabtree creek, the middle fork gives 00 84 cubic feet; Rock Camp Run 00 12 cubic feet; Savage Lick Run 00 33 cubic feet; and Crabtree creek itself, 00 97 cubic feet, at Swan's Mill, at their lowest stages; total, 2 26 cubic feet. Reservoirs may, besides, be formed in the middle fork, Savage Lick Run, and Rock Camp Run. Filtrations may also be prevented, in a great degree, by a careful construction of the bed of the canal: and, from observations taken in the summer of 1824, the loss from evaporation did not exceed the quantity received by summer rains. It may also be observed, that any deficit will prove to be amply supplied by the waters of the summit level.

From the mouth of Savage river, the canal may be supplied from the north branch of the Potomac, which, on the 18th September, gave 106 cubic feet in a second; and a great reservoir may be formed in it above the mouth of Savage river. From this point, therefore, it needs no longer the waters of Savage river nor of its tributaries.

And if we except the waters required for its lockage, which will be supplied from the summit level, this branch of the middle section may be fed, in a great degree, by the streams which fall into it.

Western Branch of the Middle Section.

This portion of the canal begins in Deep creek, five miles below the base mark, and ends at the mouth of Bear creek. The length is 14 3-4 miles; and like the former branch, it will receive from the summit level the waters required for its lockage.

Hoy's Run, Steep Run, Sang Run, and Gap Run, may be employed to feed it, and repair its losses; but these streams have not been gauged. They may, nevertheless, offer some resources for reservoirs. Bear creek may also form a great reservoir, by damming its valley, and feeding the western section of the canal, but cannot feed the western branch of the middle section, from the difference of their levels.

Deep creek is the only stream of any importance whose waters may supply the losses of this branch from filtrations and evaporation; we should, therefore, examine accurately the means which it offers for this purpose. Its usual depth under the bridge is three feet; but in its freshets it rises to twelve feet. High freshets generally occur in this stream twice or thrice a year, and last from three to four days: when the rains last so long, it gives, during that time, from 400 to 500 cubic feet a second. During the most unfavourable season it still has freshets, less considerable, but which, nevertheless, give it a mean discharge about 100 cubic feet in a second, each time: these occur from six to eight times a year. In the dryest months it gives, under the bridge, from 10 to 5 1-8 cubic feet a second: on the 17th August, 1824, it gave 5 12 cubic feet, which was the lowest quantity we ever found.

Supposing a dam erected across Deep creek, at the head of its rapids, and five miles below the base mark, its basis would be 19 1-2 feet below that mark; its length would be 136 2-3 yards, and to raise its waters four feet above the base mark, its height should be 23 1-2 feet. This dam should raise the waters of Deep creek, so as to overflow an area of 948,924 square yards, from accurate surveys. The prism of this reservoir comprised between its surface and a horizontal plane, run three feet below the base mark, would be seven feet high, and contain in capacity, 2,214,156 cubic yards. In less than three months of the rainy season, if we allow only 9 cubic feet, or one-third of a cubic yard a second, to the average supply of Deep creek, this reservoir would be filled. It would be filled in less than five months in summer, if the stream yielded at the rate of five cubic feet. Thus, every year, and for nine months of navigation, from the middle of March to the middle of December, we may depend on a supply equal to twice the capacity of this basin, or 4,428,312 cubic yards. This is equivalent to 492,034 cubic yards a month, and supposes only a mean supply of 5 1-8 cubic feet a second. This is the minimum of what Deep creek can supply to repair the losses of the western branch of the middle section, from filtrations and evaporation. To ascertain its sufficiency, we must examine next what those losses may amount to.

The length of this section is 14 3-4 miles—supposing it 5 feet deep, 28 feet broad at the bottom, and 44 feet at the surface of the water, the prism of its capacity, will have a base of 20 cubic yards, on a length of 14 3-4 miles, equal to a cubic of 519,200 cubic yards. This will be filled in the first days of March, without deranging the economy of water, which we have just analysed. We have already observed that Deep Creek may supply every month a cube nearly corresponding to this, or 492,034 cubic yards, at the minimum rate, and lowest state of its flow: we must now examine whether this supply will suffice every month to the filtrations and evaporations of 14 3-4 miles of Canal.

Without entering into minute calculations, which properly belong to the report accompanying the final project of the canal, we will state, generally, the most positive results which experience has given, as to the joint amount of filtrations and evaporations. Having ascertained that no experiments of this nature have been tried on the Erie Canal, where the supply of water was found evidently more than sufficient, we were obliged to consult the results of those canals constructed in Europe, under a climate, which, in summer comes nearest to our own. We have selected, for this purpose, the canal of Narbonne, in the South of France.—Narbonne and Baltimore, compared as to climate and rain, are as follows:

Narbonne, lat. N. 43° 11' [from observations made during twenty years,	mean, great. heat, 95° / mean temperature, 60° / mean great. cold, 24°	Mean quan. rain 29 30-100 inches
Baltimore, lat. N 39° 17' [from obser. made 1817—1822 by Mr. Lewis Brantz, of Md]	me. gr. ht. 94 54-100° / me. temp. 52 23-100° / me. gr. cld. 0 12-100°	Me. quan. of rain, 38-600 in.

Of all such works, the canal of Narbonne has given most trouble to its Engineers, from its excessive filtrations and loss of water in the gravelly soil through which it is run. It is a branch from the canal of Languedoc to the city of Narbonne, three miles in length. As soon as it was opened, in 1783, it lost the value or contents of its prism in a few days, and overflowed the surrounding country; in 1789, it still lost the value of its prism in 6 days; and in 1800, it lost it in 16 days, or the value of its prism, and 2-3 every month; (16 2-3 times its contents in 10 months navigation.) This evaluation is the result of careful and accurate observations; and, considering the climate and soil through which this canal runs, it may fairly be taken as a specimen of the maximum loss, which a canal can suffer, through filtrations and evaporations.

The ground through which runs the western branch of our middle section, is of a quality far superior to the country through which runs the Narbonne Canal. It is, for 6 1-4 miles, of an excellent quality; the remaining 8 1-2 miles run through a rugged and rocky soil, but clay is every where at hand, to puddle the bed of the canal, if necessary. Supposing, therefore, that it looses from filtrations and evaporation, equalled in one month the cube of its prism, or 519,200 cubic yards, this would certainly be their maximum, whilst the evaluation of 492,034 cubic yards of water, which we have given, as the supply from the reservoir of Deep Creek, in one month, is its minimum. For, it must be remembered, that we valued this supply from the lowest result, obtained at the lowest stage of Deep Creep, when it gave only 5 1-8 cubic feet in a second.

We have allowed no loss for the evaporation for the surface of the reservoir, as it will be compensated by the frequent rains which fall on the summit of the Alleghany. From observations made in July, August, September, and October, 1824, in the valley of Deep Creek, we have ascertained that there fell,

				mean temp.
From 19th to 30th July,	4 days of rain,	4.36 inch.		55°
" 1st to 31st Aug.	8 "	" 2.31	"	63°
" 1st to 31st Sep.	12 "	" 3.15	"	51°
" 1st to 31st Oct.	9 "	" 3.19	"	44
From 19th July to 31st Oct.	33 days rain	13	"	10

During 104 days, of which 33 were rainy, there fell 13.01 inches of rain. The evaporation was 0.10 inches a day, and during the 104 days, 10,40 inches; of course the rain more than supplied the loss of evaporation.

The temparatures marked above, are the main temperatures of the rainy days. The highest temperatures in that Valley, during these months, were at midday, in July, 76°—in August, 74°—in September, 70°—in October, 72° The lowest were at 6 in the morning; in July, 58°—in August 44°—in September, 32°, and in October, 25°.

From these observations, it is evident, that less evaporation is to be apprehended in the valley of Deep Creek, than in regions more to the level of the ocean: besides, by raising the dam which forms its reservoir, we might add to it a quantity of water, sufficient to supply all the loss of its evaporation and filtration. We will conclude these remarks on the reservoir of Deep Creek, by observing, that its surface lies below the mouths of its tributaries; and that they might, therefore, at small expense, be turned into reservoirs, to preserve the waters of the Valley, when (the great reservoir of Deep Creek being full,) they would otherwise escape over the dam. For this purpose, the dams of these small streams should have sluice gates, to distribute their supplies, whenever required.

Summit Level of the Middle Section.

From these observations, it is evident that the eastern and western branches of the middle section posses sufficient supplies to repair their losses from filtrations and evaporation. The first is 15, and the second 14¾ miles in length, and both 29¾ miles. If we subtract this length from that of the whole Deep Creek route, 41 miles 718 yards, there will remain 11 miles 1158 yards, or about 11¾ miles. If we subtract it from the length of the Youghiogeny route, (50 miles 1178 yards.) there will remain 20 miles 1580 yards, or about 21 miles. These portions, on either of these routes, may be designated as their summit levels. On the Youghiogeny route, this portion might, perhaps, be dropped below the reservoirs of the Youghiogeny; but its length and expanse of water, which is our present object, would remain the same on either level. We should now examine, first, what means exist to feed thes summit levels; second, what each of these requires to supply all its wants and losses; third, what are the respective advantages of the one and the other, and which is the most advantageous with respect to that question.

The Great and Little Youghiogeny and their upper tributaries, are the only streams of any importance which can feed either of these summit levels. Their levels, with respect to the base mark, and at different points, are as follow:

Level of the Great Youghiogeny, at the mouth of Deep Creek, below the base mark,	250 feet.
Do. at the head of Swallow Falls, do.	140.81.
Do. one mile above the mouth of Indian Run, do.	70.50
Do. two miles do. do.	64
Do. at the mouth of the Little Youghiogeny, do.	58
Do. at the mouth of Snow Creek, two miles above the bridge, do.	36.69
Do. at Charles Glade's run, do.	28.72
Do. at the mouth of Cherry tree Creek, do.	26.16
Level of the Little Youghiogeny, where it is crossed by the state road, do.	44.

(To be continued.)

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